Vol. 79, pp. 109–116 23 May 1966

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW CRAYFISH FROM ALABAMA WITH OBSERVATIONS ON THE CRISTATUS SECTION OF THE GENUS *CAMBARUS* (DECAPODA, ASTACIDAE)

By Horton H. Hobbs, Jr.
Smithsonian Institution, Washington, D. C. 20560

The new species described below is assigned to the previously monotypic Cristatus Section of the genus (Hobbs, 1955: 98). This section was erected to receive the unique *Cambarus cristatus* Hobbs from eastern Mississippi which exhibits a combination of characters shared only with this new crayfish from Alabama.

GENUS *CAMBARUS* ERICHSON, 1846

Cristatus Section

Diagnosis: Rostrum broadly ovate and subspatulate. Areola 4.6–7.5 times longer than broad and constituting 31–35.5 percent of total length of carapace. Cervical spines (or tubercles) and suborbital angles lacking. Antennal scale approximately one-half as broad as long with lamellar portion much broader than lateral thickened area. Sternum of first form male with conspicuous, setiferous, ventrally projecting prominences. Mesial process of first pleopod of male slender and projecting much farther caudad than central projection. Annulus ventralis joined cephalically to sternum by flexible membrane.

Range and habits: Both species of the Section occur within the watershed of the Tombigbee River. *Cambarus cristatus* is known from Lowndes, Noxubee, Kemper, and Lauderdale counties, Mississippi, and the new species from Sumter County, Alabama. Whether the river is effective in serving as a barrier between the two species is not definitely known but the single known locality for *C. prominens* is on the east side of the river, whereas *C. cristatus* is found west of it.

If indeed the Tombigbee River or its adjacent well-drained banks is acting as a barrier between these two secondary burrowing crayfishes, it is not unique in doing so, for it has been pointed out (Hobbs, 1942) that the Altamaha River in Georgia separates the ranges of the closely related *Procambarus barbatus* (Faxon, 1890: 621) to the north and *Procambarus pubischelae* Hobbs (1942: 41) to the south.

Presumably *C. prominens*, like *C. cristatus*, is a secondary burrower. All of the available specimens were dug from burrows in a drying roadside ditch.

Cambarus prominens,[1] new species

Diagnosis: Rostrum subplane or slightly excavate, ovate, without marginal spines or tubercles. Areola 4.6–5.7 times longer than broad and constituting 33–35.5 percent of entire length of carapace. Suborbital angle lacking. Postorbital ridges without spines or tubercles. Antennal scale more than one-half as broad as long. Chela with cristiform row of tubercles on mesial margin of palm. First pleopod of first form male with central projection directed at approximately a 110-degree angle to main shaft of appendage, and slender mesial process at a 100-degree angle. Annulus ventralis freely movable (see Fig. 2).

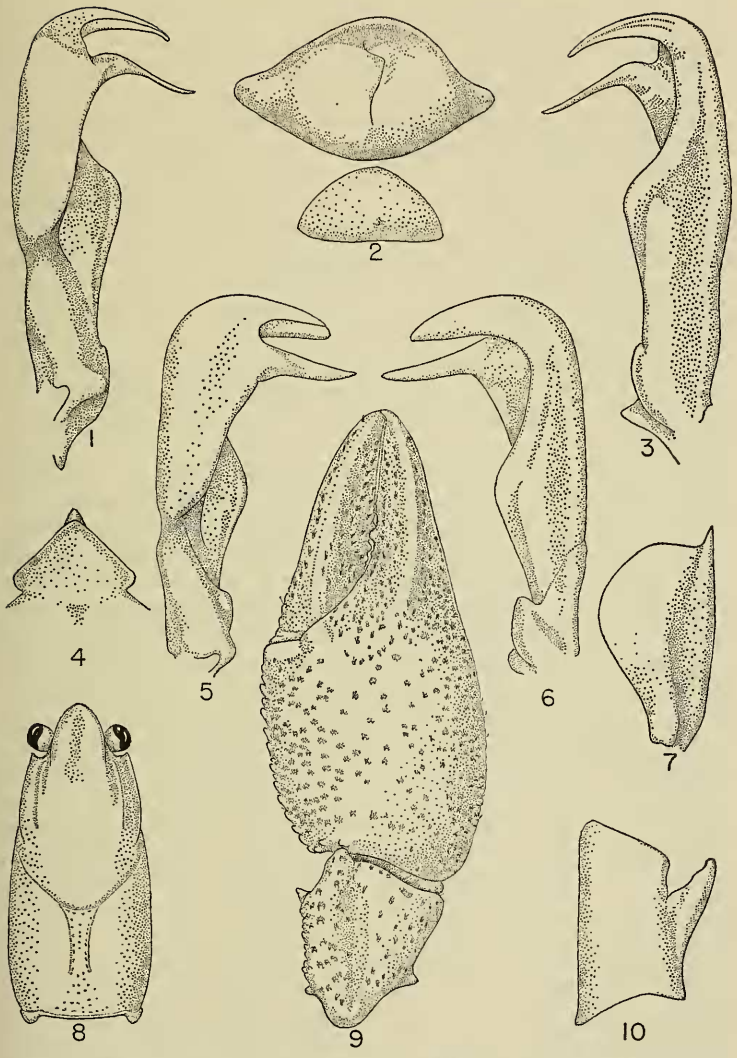
Holotypic male, form I: Body subovate, compressed laterally. Abdomen narrower than thorax (7.2–9.1 mm in widest parts respectively). Width of carapace less than depth in region of caudodorsal margin of cervical groove (9.1–9.8 mm). Areola moderately broad (5 times longer than wide), with row of punctations mesial to each branchiocardiac groove and median longitudinal row in cephalic portion, only three punctations across narrowest part. Cephalic section of carapace 1.8 times as long as areola (length of areola 35.5 percent of length of carapace). Rostrum equal in length and width, subspatulate, and without an acumen; cephalic extremity reaching penultimate podomere of antennular peduncle; margins not swollen, only slightly elevated, lacking marginal spines or tubercles. Upper surface subplane, only slightly depressed medially; surface with many punctations, most of them bearing fine setae. Subrostral ridges weak but evident in dorsal aspect along caudal half of rostrum.

Postorbital ridges well developed, long, with lateral punctations fusing cephalically to form longitudinal groove; cephalic ends without tubercles or spines. Suborbital angle lacking. Branchiostegal spines reduced to small tubercles. Cervical (lateral) spines and tubercles immediately caudal to cervical groove lacking. Carapace punctate dorsally and cephalolaterally, punctations particularly conspicuous in area immediately mesial to postorbital ridges; lateral portions of branchiostegites granulate. Abdomen longer than carapace (22.6–20.0 mm). Cephalic section of telson with five spines in each caudolateral corner; four mesial ones in each group much smaller than lateral one.

Epistome (Fig. 4) subtriangular with elevated (ventrally) margins and small cephalomedian extension. Antennules of usual form with small spine on lower surface of basal segment; mesial setal fringe of peduncle conspicuous. Antennae broken but probably extending no farther caudad than base of abdomen. Antennal scale (Fig. 7) broader in distal than in proximal half; slightly more than one-half as broad as long; outer thickened portion narrower than lamellar area and terminating distally in prominent spine.

Chela (Fig. 9) with palm broad and only slightly inflated, length of

[1] L. *prominens*—prominent; so named because of the prominent mesial process of the first pleopod and the sternal processes of the first form male.



FIGS. 1–10. *Cambarus prominens*, sp. nov. 1, Mesial view of first pleopod of holotype; 2, Annulus ventralis of allotype; 3, Lateral view of first pleopod of holotype; 4, Epistome of holotype; 5, Mesial view of first pleopod of morphotype; 6, Lateral view of first pleopod of morphotype; 7, Antennal scale of holotype; 8, Dorsal view of carapace of holotype; 9, Distal podomeres of cheliped of holotype; 10, Ischiopodite of third pereiopod of holotype.

mesial margin of palm equal to width; dorsal surface of palmar area with crowded setiferous squamous tubercles mesially and laterally, medial portion with deep setiferous punctations; lower surface of palm punctate, inner margin with cristiform row of 18 tubercles; left chela with 16 tubercles; fingers not gaping; dorsal and ventral surfaces of both fingers with submedian longitudinal ridge flanked by setiferous punctations; ridges on upper surfaces more prominent; no tubercles present on ventral surface of palm at base of dactyl; opposable margin of dactyl with 4 tubercles along proximal two-fifths, distalmost largest; mesial margin subcostate with row of setiferous punctations; opposable margin of immovable finger with three tubercles along proximal third of which distalmost largest, but smaller than larger tubercle at midlength; proximal of two large tubercles lying dorsal to row on dactyl when fingers appressed while distal one situated ventral to it; crowded minute denticles between and distal to tubercles on both fingers; lateral margin of immovable finger subcostate with lateral groove bearing row of deep setiferous punctations.

Carpus of cheliped longer than broad; dorsal surface provided with oblique groove, tuberculate mesiodorsally, otherwise with setiferous punctations; like *Cambarus cristatus,* with only two tubercles on podomere conspicuously larger than others, that on mesial surface distal to midlength and other at distal ventrolateral margin. Upper and mesial surfaces of merus punctate proximally and tuberculate distally; lateral surface entirely punctate, all punctations and tubercles with setae; lower surface with mesial row of 15 tubercles and lateral one with irregular row of 10, both rows flanked by a few additional tubercles. Mesial margin of ischiopodite with row of six tubercles.

Maxillipeds and coxae of second through fifth pereiopods heavily setose.

Ischiopodites of third pereiopods with hooks simple but strong and extending proximally to distalmost portion of basipodite (Fig. 10). Coxae of fourth pereiopods with small caudomesially projecting prominence, those of fifth pereiopods with prominent tubercle lying cephaloventral to penis and even more conspicuous one lying ventrolateral and slightly caudal to penis. Sternal projections at bases of coxopodites heavily setiferous and as conspicuous as those of *Cambarus cristatus.*

First pleopod (Figs. 1 and 3) reaching to coxopodites of third pereiopods when abdomen is flexed and lying deeply embedded between ventrally projecting sternal projections; distal portion terminating in two parts; central projection corneous, with tip subacute, bent caudally at angle of approximately 100 degrees to main shaft of appendage; mesial process non-corneous, slender, and directed subparallel to central projection; mesial process conspicuously longer than central projection; both terminal elements directed slightly mesially.

Morphotypic male, form II: Differs from the holotype in the following respects: Rostrum distinctly longer than broad, with short acumen reaching distal end of peduncle of antennule; upper surface more setose; areola 5.8 times longer than broad and constituting only 33.5 percent

of entire length of carapace; cephalic section of telson with three spines in each caudolateral corner; usual differences occur in secondary sexual characters—reduced hooks on third pereiopods and slightly reduced prominences on coxae of fourth and fifth pereiopods.

First pleopod (Figs. 5 and 6) reaching base of third pereiopods, both processes non-corneous and directed at angles only slightly less than in holotype; juvenile suture near base prominent; central projection directed slightly mesially and mesial process slightly laterally.

Allotypic female: Rostrum as in morphotype with distinct acumen and longer than broad, apex approaching distal extremity of peduncle of antennule; areola 4.6 times longer than broad and constituting 33.5 percent of carapace; cephalic section of telson with three spines in each caudolateral corner. Mesial margin of palm of chela with row of 13 tubercles; opposable margin of dactyl with two tubercles along proximal two-fifths of finger, and corresponding margin of immovable finger with two tubercles along proximal half, distal one lying under dactyl and proximal one above it when fingers meet; merus of cheliped with ventromesial row of 13 tubercles and ventrolateral one of nine; mesial margin of ischiopodite with five tubercles.

Annulus ventralis freely movable; cephalomedial portion with deep depression bordered cephalically by slightly elevated (ventrally) rim; caudal three-fourths highly elevated and inflated and bearing a 7-shaped sinus; sinus originating in cephalic depression slightly dextral to median line, curving caudosinistrally across line, there making approximately 90-degree angle and continuing caudodextrally along inflated portion, terminating some distance cephalic to caudal margin of annulus. Sternal plate immediately caudal to annulus evenly contoured, rounded cephalically, with small tubercle on median line near caudal margin.

Measurements: As follows (in mm):

	Holotype	*Allotype*	*Morphotype*
Carapace			
Height	9.8	8.4	6.7
Width	9.1	18.7	7.0
Length	20.0	19.1	15.5
Areola			
Width	1.4	1.4	0.9
Length	7.1	6.5	5.2
Rostrum			
Width	4.0	3.7	2.8
Length	4.0	4.4	3.8
Chela			
Length of mesial margin of palm	6.4	3.9	
Width of palm	6.4	4.2	
Length of lateral margin of chela	13.8	9.2	
Length of dactyl	7.4	5.4	

Color notes (*holotypic male*): Carapace purplish red with very dark splotches in area of attachments of mandibular muscles and pair of similarly colored longitudinal bars along cephalic half of branchiocardiac grooves. Ventral portions of branchiostegites lighter in color than dorsal area. Abdomen dark vermillion with pair of longitudinal, dorsolateral black bands extending from base of abdomen caudally to cephalic portion of sixth segment; epimera reddish tan. Telson and uropods pinkish straw; cephalic half of former bounded laterally and caudally by narrow band of dark brownish red; similar bands along lateral margin of mesial ramus of uropod and across distal articular line of lateral ramus. Cheliped mostly tan with black splotch on dorsal surface of palm proximal to lateral base of dactyl; medial, proximal, and lateral portions of dorsal surface of palm darker than middorsal area and fingers; dorsal surface of carpus similar to that of palm and darker area almost black. Legs brownish dorsally fading to pinkish tan ventrally; proximal two podomeres also pinkish tan.

Type-locality: Roadside ditch, three miles west of Demopolis, Sumter County, Alabama, on U. S. Rte. 80. The ditch contained sedges, grasses, and *Saururus cernuus*; dominant trees in the vicinity included *Pinus*, *Acer*, *Liriodendron*, and *Quercus*. On 18 April 1965, when the collection was made the ditch was almost dry, hundreds of tadpoles were stranded in the few remaining pools, and crayfish burrows riddled the sandy clay soil. The latter was so pliable that the burrows could be dug without the use of trowel or shovel. A few of the burrows higher on the bank, presumably those of *Cambarus d. diogenes* Girard (1852: 88), were more than two feet deep, but most were less than a foot in depth. All of the shallower ones were simple, straight, and vertical or slightly inclined.

Other crayfishes associated with *Cambarus prominens* in the ditch were *Procambarus hybus* Hobbs and Walton (1957: 39), *P. acutus acutus* Girard (1852: 91), and *Cambarus diogenes diogenes* Girard.

Disposition of types: The holotypic male, form I, the morphotypic male, form II, and the allotypic female are deposited in the United States National Museum (nos. 115603, 115604, and 115605, respectively). Of the four paratypes, one male, form I, and a female are deposited in the Museum of Comparative Zoology and two females are in the U. S. National Museum.

Variations: The most conspicuous variation is in the areola; in the morphotype it appears to be much narrower than in the other specimens. The apparent greater length in the holotype (see measurements), in which it constitutes 35.5 percent of the length of the carapace, however, is not due to its length but rather to the short rostrum which lacks an acumen, thereby giving a higher ratio. In the remaining specimens the areola does not exceed 34.8 percent of the length of the carapace. There are slight differences in tubercle counts and in the numbers of spines but most of these are within the range of variations noted in the accounts of the allotypes and morphotype.

Relationships: In assigning *Cambarus prominens* to the previously monotypic Cristatus Section of the genus, it is obvious that *Cambarus cristatus* is considered to be its closest relative. It may be distinguished from *C. cristatus* by its longer areola, constituting 33 to 35.5 percent of the length of the carapace as opposed to less than 33 percent (in 40 adults), and the more strongly bent terminal elements of the first pleopod of the first form male—central projection 110 degrees and mesial process 100 degrees as opposed to 65 and 90 degrees respectively. The characters shared by the two are summarized in the diagnosis of the Section. Several observations on these characters are pertinent.

The generalization has been made that most crayfishes occupying temporary bodies of water or burrows have narrow and, most frequently, long areolae. Exceptions to this were known when the generalization was made, and the two members of this Section join most Cambarellinae, most members of the Barbatus Section (Hobbs, 1942: 33) of the genus *Procambarus, P. hinei* (Ortmann, 1905: 401) and the two members of *Faxonella* in providing exceptions to the generalization. What morphological and physiological mechanisms are involved in this are not known.

The absence of cervical spines or tubercles may be correlated with the burrowing habit, for all habitual burrowers have these eminences reduced or obsolete.

The broad antennal scale, found elsewhere in the genus *Cambarus* only among the troglobitic members (Hobbs and Barr, 1960), is associated with the broad rostrum which provides shelter beneath it for the wide lamellar portion.

The broad, flat rostrum without marginal spines or tubercles is typical of many of the secondary burrowers (Hobbs, 1942: 20), *e.g.*, the Barbatus Section of *Procambarus* and *Faxonella*, but is unique in the genus *Cambarus*.

The conspicuously large setiferous sternal processes in the male have not been observed in other crayfishes but it is obvious that without extending the sternal processes or in some way deepening the sternum to receive the first pleopods, the tips of the mesial processes would be exposed and, if so, could easily be injured, particularly during the construction of burrows. Thus there seems to be an association of the long recurved mesial process and the "protective" setiferous sternal projections. An elongate mesial process is also found in *Cambarus asperimanus* Faxon (1914: 391), *C. conasaugaensis* Hobbs and Hobbs (1962: 41), *C. fodiens* Cottle (1863: 217), *C. uhleri* Faxon (1884: 116), *C. hedgpethi* Hobbs (1948: 224), and *C. oryktes* Penn and Marlow (1959: 197). In the latter four it is slender as in *C. cristatus* and *C. prominens*; however, in all of them it is twisted, and in none does it project relatively so far caudad in relation to the central projection.

The freely movable annulus ventralis is characteristic of the Cambarellinae, most *Procambarus*, *Troglocambarus*, *Paracambarus*, and some *Cambarus* but rare in *Orconectes*.

Acknowledgments: I am grateful to Messrs. Robert Dowden, Thomas

Simpson, and George Tate, all of Louisiana State University, for assisting me in collecting the crayfish on which this description is based.

Literature Cited

Cottle, T. J., Esq. 1863. On the two species of *Astacus* found in upper Canada. Canad. Jour. Indust., Sci., and Arts, (45): 216–219.

Erichson, W. F. 1846. Übersicht der Arten der Gattung *Astacus*. Arch. fur Naturgesch., 12 (part 1): 86–103.

Faxon, Walter. 1884. Descriptions of new species of *Cambarus* to which is added a synonymical list of the known species of *Cambarus* and *Astacus*. Proc. Amer. Acad. Arts and Sci., 20: 107–158.

————. 1890. Notes on North American crayfishes, family Astacidae. Proc. U. S. Nat. Mus., 12 (785): 619–634.

————. 1914. Notes on the crayfishes in the United States National Museum and the Museum of Comparative Zoology with descriptions of new species and subspecies to which is appended a catalogue of the known species and subspecies. Mem. Mus. Comp. Zool., Harvard Coll., 40 (8): 351–427, 13 pls.

Girard, Charles. 1852. A revision of the North American Astaci, with observations on their habits and geographical distribution. Proc. Acad. Nat. Sci., Phila., 6: 87–91.

Hobbs, Horton H., Jr. 1942. The crayfishes of Florida. Univ. Fla. Publ., Biol. Series, 3 (2): 1–179, 346 Figs., 11 maps.

————. 1948. A new crayfish of the genus *Cambarus* from Texas, with notes on the distribution of *Cambarus fodiens* (Cottle). Proc. U. S. Nat. Mus., 98 (3230): 223–231, 1 Fig.

————. 1955. A new crayfish of the genus *Cambarus* from Mississippi. Proc. Biol. Soc. Wash., 68: 95–100, 11 Figs.

———— and Thomas C. Barr, Jr. 1960. The origins and affinities of the crayfishes of North America (Decapoda, Astacidae). I. The genus *Cambarus*. Amer. Midl. Nat., 64 (1): 12–33, 57 Figs.

———— and H. H. Hobbs, III. 1962. A new crayfish of the genus *Cambarus* from Georgia (Decapoda, Astacidae). Proc. Biol. Soc. Wash., 75: 41–45, 10 Figs.

———— and Margaret Walton. 1957. Three new crayfishes from Alabama and Mississippi (Decapoda: Astacidae). Tulane Studies in Zool., 5 (3): 39–52, 34 Figs.

Ortmann, A. E. 1905. A new species of *Cambarus* from Louisiana. Ohio Nat., 6 (2): 401–403, 1 Fig.

Penn, George Henry, Jr. and Guy Marlow. 1959. The genus *Cambarus* in Louisiana. Amer. Midl. Nat., 61 (1): 191–203, 14 Figs.